

Find the exact value of each trigonometric function.

1. $\sin \frac{5\pi}{12}$

2. $\cos \frac{7\pi}{12}$

3. $\tan 15^\circ$

4. $\sec\left(-\frac{\pi}{12}\right)$

Find the exact values for each expression.

5. $\sin 20^\circ \cos 10^\circ + \cos 20^\circ \sin 10^\circ$

6. $\cos 40^\circ \cos 10^\circ + \sin 40^\circ \sin 10^\circ$

7. $\frac{\tan 40^\circ - \tan 10^\circ}{1 + \tan 40^\circ \tan 10^\circ}$

Find the exact value of each of the following under the given conditions.

8. Find $\sin(x+y)$ if $\sin x = 3/5$, $0 < x < \pi/2$; $\cos y = \frac{2\sqrt{5}}{5}$, $-\frac{\pi}{2} < y < 0$

9. Find $\cos(x-y)$ if $\cos x = \frac{\sqrt{5}}{5}$, $0 < x < \frac{\pi}{2}$; $\sin y = -4/5$, $-\frac{\pi}{2} < y < 0$

10. Find $\tan(x+y)$ if $\tan x = -4/3$, $\frac{\pi}{2} < x < \pi$; $\cos y = 1/2$, $0 < y < \frac{\pi}{2}$

Verify the identities.

11. $\sin\left(\frac{\pi}{2} + \theta\right) = \cos \theta$

12. $\sin \theta \csc \theta - \cos^2 \theta = \sin^2 \theta$

13. $1 - \frac{\sin^2 \theta}{1 + \cos \theta} = \cos \theta$

$$14. \frac{\sin(x+y)}{\sin(x-y)} = \frac{\tan x + \tan y}{\tan x - \tan y}$$

$$15. \sec^4 \theta - \sec^2 \theta = \tan^4 \theta + \tan^2 \theta$$

$$16. \cos\left(\frac{\pi}{2} + \theta\right) = -\sin \theta$$

Solve each equation on the interval $0 \leq \theta < 2\pi$.

$$17. 2\cos^2 \theta + \cos \theta = 0$$

$$18. \tan\left(\frac{\theta}{2} + \frac{\pi}{3}\right) = 1$$

$$19. 4\cos \theta = 1 + 2\cos \theta$$

Use a graphing utility to solve each equation on the interval $0 \leq \theta < 2\pi$.

$$20. 2x = 5\cos x$$

$$21. \sin x = \ln x$$

$$22. 2\sin x + 3\cos x = 4x$$

23. Write $\sin(\arcsin x + \arccos x)$ as an algebraic expression.

24. Find the value of the expression without a calculator. $\cos(\arcsin(-1) + \arccos(0))$